Here are some excerpts from the book but this is only a sample – There are learning opportunities for everyone. If it weren't so, the NTSB wouldn't be investigating several crashes per day. I hope you enjoy and that curiosity will kick in to see more…..Bruce

Chapter 1 - WHY ARE WE HERE? - Sample

The aviation safety book will never be written—there will always be more to learn. The basic art and science of flight aren't that difficult, but if one's only skill is regurgitating information on a written test or flying only occasionally, that does not serve well when faced with a nasty crosswind, a convective weather system, or a missed approach in low weather. Doing just "good enough" isn't the path to mastery.

I'll try to avoid obvious repetition, but reviewing essential truths helps new pilots flatten their learning curve. More experienced fliers may be reminded of how they gained that experience—and lived to talk about it. The hits just keep on coming for the same reasons, and review helps keep

us out of the rough. The scheduled airlines in some parts of the world have a remarkable safety record, but they follow stringent protocols for crash prevention. However, many of the same mistakes that are prevalent in general aviation (GA) still occur in the air carrier and corporate world—just not nearly as often.

As discussed later, comparing light GA aircraft safety to airline safety is a false equivalence. That doesn't mean we should stop trying.

The legend of Icarus is the first aviation crash that never happened—long before powered flight was possible. Daedalus and his son, Icarus, were imprisoned in a tower on an island by an evil Greek king. Daedalus planned an aerial escape and built two sets of wings by collecting feathers from birds that landed on the tower window and using candle wax from their prison cell. He warned Icarus not to fly too high, as the sun would melt the wax holding the feathers in place.

Icarus defeathered, Author

But Icarus, certain that he knew better and enthralled by the excitement of flight, flew much higher than his father recommended. The wax melted, and he crashed into the sea. His father knew from experience the properties of wax when subjected to heat and understood the limitations of the equipment, but his son misjudged the risk. How prophetic. We can learn a lot from Icarus.

"All limits are self-imposed."

Icarus, the first "aviator" who mythically crashed before airplanes existed

Some limits are circumstantial, while others are absolute. In too many of life's pursuits, we self-limit. The very act of becoming a pilot requires pushing beyond our limits. However, flying safely demands wisdom and knowing when to say "when." After every flight, take a moment to reflect on what went well and what could have been done better. That's how athletes, musicians, and professionals in every field reach the top of their game. Minor improvements add up.

As a new instructor, my students taught me more in the first six months than I ever taught them. The learning curve was steep for both student and teacher. I was teaching at the Part 141 school where I had trained, working alongside experienced CFIs who reviewed my students during the required phase checks. There was constant "feedback" on my failings—plenty of them. It was hard on the ego, but what an education.

For those of us who've been flying for a while, it's important to remember how we got this far. Self-accountability and humility go a long way. We've all heard of "pros" and high-time pilots who landed downwind, landed hot, flew into terrain, tangled with weather, or made basic errors that everyone knows they shouldn't. Some survived—many did not. No matter how full the logbook, the next flight is always the most critical.

Quotes
There are quotes from brilliant people throughout this book to help convey key points. In some cases, they are my own fabrication.

"Quote me as saying I was misquoted."

Groucho Marx, Comedian

Fix It?
The "silver bullet" solution—like the free lunch—doesn't exist because the opportunity to make bad decisions arises on every flight. Safety is always a journey, never a destination. Perfect safety in any mode of transportation doesn't exist—not yet—but we can get closer. The airlines have proven that.

Learning to fly is a growth process. Almost everyone who goes through it is significantly changed. The discipline, science, decision-making, and physical eye-hand-foot coordination required to fly are not to be dismissed lightly in this increasingly virtual, keyboard-driven world. Fortunately, these skills can be learned by most people. While new technology has the potential to make aviation easier, mastery still requires study, practice, and introspection.

Part 91 (Personal flight)pilots have the freedom to decide how much risk they take on, but they will be held accountable—whether by the authorities, the laws of physics (gravity), or their insurance companies—for bad decisions. However, non-participants (people on the ground or in other aircraft) and our passengers have an absolute right to life, regardless of how much risk we may personally accept.

----------BREAK ----------

Take your time, and don't try to absorb all of this at once. That avoids the TL;DR (*Too Long, Didn't Read*) temptation. There are decades of flight education here from master pilots. My role was merely to chronicle and provide some examples of hard-learned experience. Read the introductions before going to the case studies. The case studies were selected based on their experience potential. Some date back decades, but their lessons are just as pertinent today as they were when the crash happened. The same types of crashes still occur, or they played a significant role in shaping our regulatory and airspace systems.

Some of the communication transcripts are detailed but take the time to understand how things got so balled up. The message will be repeated because that's how it sticks. The cost of learning all this was astronomical in terms of human suffering and dollars. Pilots better skilled and smarter than most of us have come to grief—but we don't have to.

There are air carrier, high-end general aviation, and light aircraft crashes—enough learning opportunities for everyone. When you're inevitably faced with a flight decision, remember the catastrophes cataloged here. Perhaps your random-access memory will kick in to advise caution—a small voice that says, *"I've seen this somewhere before."* My goal is not to be preachy but to pass along the wisdom that was given to me, in some cases before I was ready to receive it. I hope you're smarter.

"Ships in harbor are safe, but that is not what ships are built for."

John Shedd, author and professor

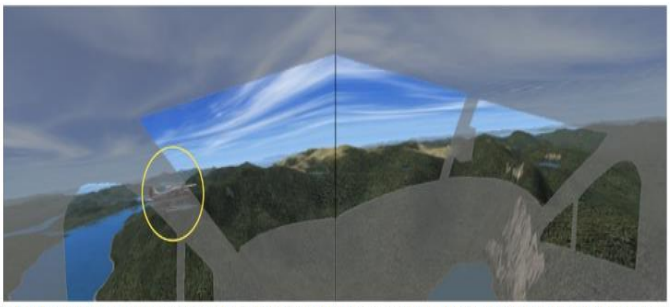
----------BREAK ----------

Chapter 2 – Human Factors or why is it always us? - Sample

….. Human Frailty in Aviation

See and Avoid - The "see and avoid" principle works about half the time—maybe. It underpins VFR flight operations, assuming that pilots flying in visual conditions will maintain a constant lookout and avoid close encounters. Most of the time, this works—not necessarily due to diligent scanning, but because the sky is vast and aircraft occupy only a small part of it. However, in confined airspace—near airports, on final approach, at airshows, in high-traffic practice areas, or dense sightseeing zones—encounters become more likely.

Several factors work against "see and avoid." Human vision and brain processing allow us to focus on only one area at a time. Anything on a collision course will have no relative movement—it remains a pinpoint in the windshield until it suddenly "blossoms" at the last moment, often too late. Sun glare and ground clutter further obscure targets. Distractions from other cockpit duties also play a role. In some cases, an approaching aircraft is hidden behind a structural element, such as a windshield post, door frame, wing, or even the aircraft's nose. A passenger might also obstruct the view.
The target may remain behind this blocking structure, only briefly visible during maneuvering—or never seen at all.



Note: A yellow circle superimposed on the left windshield represents the DHC-2, which is mostly hidden by the left windshield post.

Target hidden behind door post, NTSB

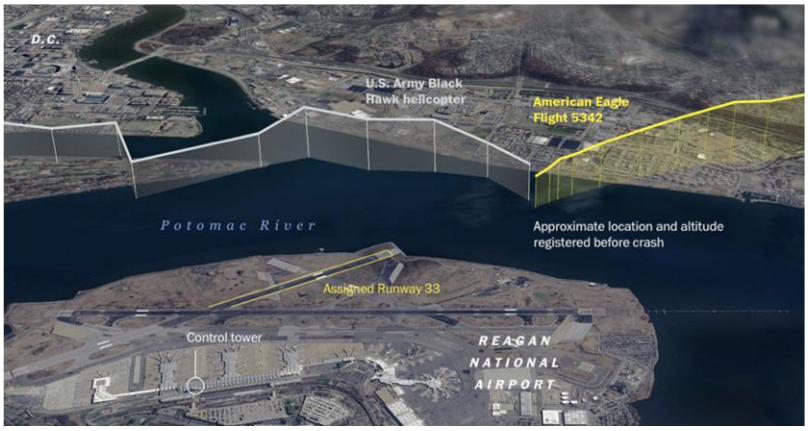
After the Cerritos, California, crash—where a Piper Archer brought down an AeroMexico DC-9—the entire air traffic control (ATC) system changed. Airliners were mandated to fly in largely protected airspace and were required to have a sophisticated Traffic Collision Avoidance System (TCAS), which detects potential threats and directs pilots to take evasive action. General aviation was

only allowed into high-density airspace if equipped with Mode C transponders to broadcast altitude and presence, along with proper training and either clearance or established communication.
This concept was further expanded with the advent of ADS-B, significantly improving traffic awareness in the cockpit.

For nearly 40 years, this system worked flawlessly—until the collision at Reagan National Airport (DCA). Just before the publication of this book, a U.S. Army Black Hawk helicopter collided with a Bombardier regional jet on short final approach into DCA. At this writing, the accident is still in the preliminary investigation stages, so any analysis remains subject to change.

The details, briefly: It was a windy, clear VFR night. An American Airlines regional jet was cleared to land on crosswind Runway 33. Below its final approach path, at about 200 feet AGL, ran a high-density helicopter route along the east side of the Potomac River. Normally, a dedicated controller manages helicopter traffic while the local tower controller handles fixed-wing arrivals. However, in this case, the two roles were combined—possibly due to a lull in activity or staffing shortages.

Several factors will likely come under scrutiny, including the Army helicopter's adherence to route parameters and the overall risk posed by the low-altitude helicopter corridor. Prior reports had already documented close calls and missed approaches involving fixed-wing aircraft and helicopters in the area. This will likely prompt a review of why existing safety reporting systems failed to address the issue and whether corrective actions should have been taken earlier.



DCA Crash - ADS-B Track Preliminary

In response to the crash, the FAA immediately shut down the helicopter route.

The Flight Data Recorders and Cockpit Voice Recorders were recovered from both aircraft, which will make assessing this tragedy much easier. Were the altimeters on the Black Hawk set properly and reading correctly? There are plenty of possibilities. Was the crew wearing night vision goggles, which can make spotting traffic more difficult against background lights? TCAS did not alert because, by design, it is disabled close to the ground…..

----------BREAK ----------

…..VFR into IMC

How many Visual Flight Rules (VFR) pilots inadvertently enter Instrument Meteorological Conditions (IMC)? We don't know. The failures are obvious and brutal, but what about the successes? What are the odds that an untrained pilot can survive? Experimental ethics prevent us from conducting the kind of test needed to determine the chances of a successful VFR-to-IMC encounter. It might be interesting to try it in a simulator—comparing state-of-the-art technology against basic instruments with no autopilot. However, that could embolden some pilots to make a habit of flying in IMC without a clearance.

"If at first you don't succeed, then skydiving definitely isn't for you."

Stephen Wright, Author, humorist

Occasionally, you'll read someone's breathless account of how flying into IMC without an instrument rating really wasn't so hard, and that the fear surrounding it is overrated. Once again, we're only looking at one side of the picture. The caveat is that IMC comes in both gentle and not-so-gentle forms. It could be easy, or it could be life-ending. Additionally, while the odds are pretty good that you won't collide with another aircraft, the irresponsibility of deliberately entering the clouds without informing ATC of your location is, in my view, a hanging offense.

Before and during my time at the NTSB, there were crashes involving airline pilots who had lied about their backgrounds to get hired. Their training records were poor, with multiple failures. Having a bad day or failing once isn't necessarily a red flag—it's the repetitive failures that indicate a serious problem. At the time, the pilot records system wasn't robust enough to catch these issues before they led to the destruction of aircraft, passengers, and sometimes even people on the ground.

Now, commercial operators are required to maintain training records for all their pilots and enter them into a central FAA database. The hope is that this system will prevent tragedies like the Colgan crash (cited later in this chapter).

Despite Lindbergh's quote in the introduction about how the system is too eager to devour anyone, aviation is a performance-based activity. When lives are at stake, things must be done properly. While there is some flexibility for minor mistakes, too many errors—or a single critical mistake—can lead to disaster.

However, it's not always the pilot at fault. There are systemic failures. Management often shares a major part of the blame, as demonstrated by Dr. Reason's Swiss cheese model—presuming there is a management structure in place at all. The NTSB strongly supports the Safety Management System (SMS), a core component of safe flight operations. The idea is that safety must be ingrained in an operation's culture, with everyone actively thinking about it, discussing it, and feeling empowered to raise concerns without fear of punishment.

While the concept sounds simple, keeping SMS effective day in and day out requires continuous effort from leadership down to frontline personnel. When a crash occurs, investigations often reveal cracks in the system that people had taken for granted.

For small Part 91 (non-commercial) and Part 135 (air taxi) operators, you are the management. At this writing, the FAA hasn't quite figured out how small operators can effectively implement SMS. The concept is solid, but long-term execution remains a challenge.

"Financially gifted but aeronautically challenged."

Author, but somebody else has likely said it too

At FlightSafety International, while providing training for high-performance singles, twins, and turboprops, we saw many highly successful individuals. They excelled in their careers and could afford first-class aircraft, but some were in desperate need of professional aviation training to safely operate them.

Most improved significantly, some did not complete the training, and a few of those later crashed. There are people who simply shouldn't fly, and while the system does a fairly good job of filtering them out before accidents occur, it's not perfect.

"Ignorance more frequently begets confidence than does knowledge."

Charles Darwin, Scientist, author of On the Origin of Species

The freedom to pursue flight must always be balanced against the safety of the non-participating public and our passengers. There is an irrational fear among the public and some legislators that light aircraft pose a significant risk. They don't. In a typical year, there are only a handful of non-participating fatalities. Compared to other everyday risks—such as highway accidents—the chances of an aircraft falling on someone are exceedingly low.
However, when the rare crash does occur, it is sometimes used as justification to restrict flight. Passengers entrust their lives to us and deserve our utmost consideration…..

----------BREAK ----------

Colgan Calamity – Sample Case Study excerpt

A tragic series of failures changed the airline hiring world.

"Turn on, Tune In, and Drop out"

Timothy Leary/ Marshall McLuhan1960's (counter-culture figure and media studies professor)

While Leary and McLuhan were referring to mind-altering substances, too many pilots approach advanced avionics systems with a similar mindset. They turn them on, tune or program them to what seems correct, and mentally check out, assuming the system will handle everything. And most of the time, it does—until it doesn't. That's when complacency becomes a real hazard.

Q-400, Bombardier

Ice Detection warning, NTSB

As a landmark accident, this one ranks near the top. Human factors and aircraft automation were intertwined as causal factors. Airmanship played a key role, proving that no matter how sophisticated the aircraft or routine the flight might be, basic skills and adherence to procedure are essential. The failures here were both individual and systemic, which we'll discuss in the commentary.

For pilots considering an airline career, this crash had far-reaching consequences. Hiring requirements for first officers at regional airlines were significantly increased. While it was theoretically possible to be hired with just 250 hours, a commercial certificate, and a new multi-engine rating, that was far from the norm in the United States. Those minimums were often cited as justification for dramatically increasing the requirements.

Previously, regional airlines typically required between 700 and 1,200 total flight hours, a commercial certificate, and at least 50 hours of multi-engine time. FlightSafety ran an airline selection program years ago that included simulation, knowledge, and personality evaluations. This program provided an alternative way to identify high-potential pilots, and graduates never encountered issues transitioning to airline operations.

The Flight

On February 12, 2009, a Colgan Air Bombardier DHC-8-400 (Q400), operating as Continental Connection Flight 3407, was scheduled to depart Newark International Airport (EWR) at 7:10 p.m. Eastern Standard Time for a 53-minute flight to Buffalo-Niagara International Airport (BUF) in Buffalo, New York.

According to the NTSB report, as the crew prepared to taxi at 8:41 p.m., the first officer (FO) remarked, “I’m ready to be in the hotel room.” She continued, “This is one of those times that if I felt like this when I was at home, there’s no way I would have come all the way out here. If I call in sick now, I’ve got to put myself in a hotel until I feel better… we’ll see how… it feels flying. If the pressure’s just too much… I could always call in tomorrow. At least I’m in a hotel on the company’s buck, but we’ll see. I’m pretty tough.” Her comments reflected the economic penalties some carriers imposed on pilots for calling in sick.

Flight 3407 was airborne at 9:18 p.m., with the captain flying and the FO acting as the pilot monitoring. The climb and cruise were uneventful. Propeller, airframe, and pitot-static deice equipment were operating normally, and the autopilot was engaged. The crew engaged in nearly continuous conversation throughout these phases of flight.

At about 9:53 p.m., the first officer (FO) briefed the airspeeds for landing: flaps set to 15°, 118 knots Vref, with 114 knots for a go-around speed.

At approximately 9:56 p.m., the FO remarked, “Might be easier on my ears if we start going down sooner.” The Cleveland Center controller approved a descent from 16,000 to 11,000 feet.

At about 10:06 p.m., the flight was cleared to descend through 10,000 feet, where the sterile cockpit rule (FAR 121.542) came into effect, prohibiting conversation on non-operationally pertinent topics. The crew ignored it.

The flight was then cleared down to 4,000 feet. The captain asked the FO about her ears, and she acknowledged they were “popping.” The conversation then shifted to icing.

At approximately 10:10 p.m., the FO noted ice on her windshield and asked if the captain was seeing any. The captain asked how her side of the windshield looked, to which she responded, “Lots of ice.”

According to the NTSB, “The captain then stated, ‘That’s the most I’ve seen—most ice I’ve seen on the leading edges in a long time. In a while anyway, I should say.’ About 10 seconds later, the captain and the first officer began a conversation that was unrelated to their flying duties. During that conversation, the first officer indicated that she had accumulated more actual flight time in icing conditions on her first day of initial operating experience (IOE) with Colgan than she had before her employment with the company.”

The NTSB report continued: “She also stated that, when other company first officers were ‘complaining’ about not yet having upgraded to captain, she was thinking that she ‘wouldn’t mind going through a winter in the Northeast before [upgrading] to captain.’ The first officer explained that, before IOE, she had ‘never seen icing conditions… never deiced… never experienced any of that.’”

At about 10:12 p.m., the approach controller cleared the flight down to 2,300 feet. While performing flight-related duties, the non-pertinent conversation continued. At 10:13 p.m., the captain called for the descent and approach checklists, which the first officer performed.

The autopilot altitude hold mode was selected, and the autopilot leveled the aircraft at the preselected altitude of 2,300 feet at an airspeed of 180 knots. The captain called for flaps to be set at 5 degrees. The flight was subsequently cleared for the approach, and the captain began to slow the airplane.

According to the NTSB, “The engine power levers were reduced to about 42 degrees (flight idle was 35 degrees). At 10:16 p.m., both engines’ torque values were at minimum thrust.” The aircraft was slowing rapidly. (Degrees refer to the angle of the levers, not the power setting.)……

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Chapter 3 Takeoffs are Optional, Landings are Mandatory - Sample

"Takeoffs and landings must come out even, if you want to use the aircraft again."

Ancient aviation lore

Takeoffs and landings provide some of the greatest satisfactions and challenges of flying. The aircraft operates close to the edge of the flight envelope—and so, it would seem, do many pilots.

Boeing maintains a 10-year rolling average of worldwide commercial jet aircraft fatal accidents. A recent report notes that for an average 1.5-hour flight, only two percent of the time is spent in takeoff and initial climb—yet that phase accounts for 13 percent of crashes. Final approach (aptly named) and landings make up only four percent of flight time but a staggering 55 percent of fatal air carrier accidents. General aviation has similar numbers—close to the ground is where the problems occur. After all, no one ever collided with the sky.

Some well-known airline landing excursions include the Southwest Airlines 737 at Chicago Midway that slid off the end of a snowy runway (Overrun, this chapter) and an American Airlines MD-82 that hydroplaned while landing during a thunderstorm in Little Rock, AR (Bowling Alley Blues—this chapter). Runway contamination or adverse winds make landings more difficult—sometimes impossibly so.

Bad day in Toronto - runway excursion, Canadian TSB

Much of general aviation operates out of short or obstructed runways—places where optimistic thinking can take you where no pilot has successfully gone before. At the small airport where I learned to fly, a transient pilot would "tiptoe through the tulips" about every six months. The trees and a railroad embankment did a fine job of stopping airplanes but didn't do much for preserving them in flyable condition. There was great incentive to be on speed and altitude…..

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The Goldilocks parameters—not too much, not too little, just right—are known technically as a "stabilized approach." Airlines and corporate operators emphasize this concept, and it applies to all flying machines. The idea is simple: speed, alignment, and altitude should allow the aircraft to touch down within the first third of the runway.

The Citation Jet Pilots Association (CJP) implemented a program several years ago to improve the landing safety performance of its members. This largely owner-flown group had a somewhat checkered history of landing mishaps, and their insurance rates reflected that. As you'll read in the Automation chapter, the benefits of monitoring and analyzing performance can hardly be overstated…..

----------BREAK ----------

You'll see some interesting interpretations of "stable" while watching arrivals at aviation gatherings or just observing at any airport. It's best to watch from the sidelines. Simple is good, but one size rarely fits all situations. Can light aircraft adjust more quickly, even when below 500 feet AGL? Of course. Many CFIs won't call for a go-around at 400 feet unless the student is completely outside the parameters. With bigger machines, inertia exercises its prerogatives. On shorter runways, touching down on the 1,000-foot marker (the big white ones) leaves a lot of useful—and perhaps necessary—runway behind. However, in low visibility conditions, it's best to stay on the glideslope. Instrument runways usually have adequate length, except when contaminated or when there's a tailwind….

"Practice makes perfect."

A common misconception

It does not. Again, quoting football coach Vince Lombardi, "Perfect practice makes perfect." Doing it wrong just reinforces bad habits. Pros work at it, while amateurs accept mediocrity……

----------BREAK ----------

Nobody is Flying Today! - (Mooney M20E sheared on Takeoff) - Sample Case Study -

A low time Mooney pilot tangles with big winds in New Mexico on takeoff with a nearly full load and out of balance.

"Experience is a hard teacher because she gives the test first and the lesson afterwards."

Vernon Law, major league baseball player

Exemplar Mooney M20E

A few years back, a Mooney pilot decided to challenge the strong winds in New Mexico. The results were catastrophic and serve as a reminder that local knowledge and published warnings about airport conditions should always be heeded. It's also a case of overconfidence and a lack of understanding of

the realities of weather, despite limited experience.

The Environment – On March 3, 2013, in the early afternoon, the pilot and three passengers prepared to depart Angel Fire, New Mexico, airport (KAXX) for their return to the San Antonio, Texas, area, where they lived. The weather that day was not conducive to flying light aircraft, and the airport attendant questioned the pilot about his intention to fly in such conditions. According to the NTSB, “The pilot indicated that he planned to fly and that the winds would not be a problem.”

The automated weather system (AWOS) reported winds out of the west from 250 degrees at 33 knots, gusting to 47 knots, with visibility of 10 miles, a clear sky, a temperature of 47 degrees Fahrenheit (F), a dew point of 17 degrees F, and a barometric pressure of 29.93 inches of mercury. The density altitude was calculated at 9,549 feet. The north-south runway is 8,900 feet long, and the airport elevation is 8,380 feet. The terrain just west of the airport rises 2,000 feet above the airport elevation.

The Flight – The short-body Mooney M20E, loaded with four people, taxied out to Runway 17. According to the NTSB, “The current wind and altimeter were relayed to the pilot by the FBO employee, which were repeated by the pilot. Due to snow piles on the airfield, the FBO employee could not see the takeoff and next saw the airplane airborne with a significant crab angle into the wind, about 40 degrees right of the runway heading. The airplane rose and fell repeatedly as its wings rocked. Then, the airport employee saw the airplane’s right wing rise rapidly. The airplane rolled left and descended inverted, with the airplane’s nose pointed straight down.”

A witness driving by the airport reported that the Mooney was struggling, reaching an altitude of only about 100 feet, where it hovered momentarily before the left wing dropped and the aircraft descended nose-first to the ground. There were no survivors.
The Pilot – The 33-year-old pilot held a private certificate for airplane single-engine land and a current medical certificate. His insurance application, filed about six months before the accident, reported 459 total flight hours, with 384 in type. His occupation was engineering, and he had worked at Mooney Aircraft and Boeing and was currently employed by SyberJet.

The pilot told the airport manager that he had flown the accident airplane for five years and that KAXX was the highest-elevation airport he had visited. His experience flying to other high-altitude airports was unknown. The evening before the accident, the pilot’s cousin, who lived in the area, talked about airplane crashes in and around Angel Fire. The pilot responded that flying in wind did not bother him.

The Aircraft – The logbooks of the 1966 Mooney burned in the post-impact fire, but receipts showed that the last annual inspection had occurred three months earlier, in December 2012, with a total airframe time of 4,752 hours. The engine had 1,736.7 hours since its major overhaul. At the time of the accident, the tachometer read 4,785.8 hours.

An old copy of the airplane's weight and balance found in the wreckage was used to estimate the weight and center of gravity. The luggage was destroyed but estimated to weigh about 60 pounds. With approximately half a tank of fuel, the takeoff weight was calculated at 2,519 pounds, about 56 pounds below maximum. However, the center of gravity was computed slightly aft of the envelope.

Note terrain west of the airport, FAA

It's best not to keep pilot or aircraft logbooks on board. This makes crash investigations easier, and in the event of a ramp check, the FAA will have fewer items to immediately "contemplate."

Former Mooney engineering test pilot Bob Kromer provided guidance regarding crosswind landings: "I think you will find a common consensus of test pilot opinion that most Mooneys can be operated in 90-degree crosswinds up to 15 knots with an acceptable level of pilot workload. Crosswinds of 15–20 knots can be handled but require a much higher level of pilot proficiency and skill in crosswind landing techniques. At 20 knots or above, you should consider finding another airport to land."

After impact, the airspeed indicator read 81 mph. The attitude indicator showed a left-wing-low, inverted attitude. The tachometer read 2,000 rpm. (It was not noted in the report what the manifold pressure reading was.) There were no signs of mechanical failure.

……
A weather model simulating conditions at the time of the accident predicted a "turbulent mountain wave environment, with low-level wind shear, updrafts and downdrafts, downslope winds, and an environment conducive for rotors." There was no record of the pilot receiving an official weather briefing, nor is it known what other sources he may have consulted. The airport manager noted that no other flights had arrived or departed that day.

NTSB Probable Cause
"…The pilot's loss of control while flying in a turbulent mountain-wave environment. Contributing to the accident was the pilot's overconfidence in his ability to safely pilot the airplane in gusting wind conditions and his lack of experience operating in mountainous areas."

Commentary
The accident occurred on a Sunday, so perhaps there was some compelling job-related pressure to return before the beginning of the workweek. When flying light aircraft, if there is an urgent need to be somewhere on a schedule, flexibility is essential, or alternative transportation options should be considered. It's wise to allow a few extra days to depart earlier or later. If that luxury isn't available, having a Plan B is critical.

Having flown an M20E around much of the country, I have great appreciation for the aircraft's cruise speed and fuel efficiency. However, even at low-density altitudes, it is not a strong climber when fully loaded. Although the official service ceiling is 19,500 feet, it would take a long time to reach that altitude.

The accident report noted the tachometer reading at 2,000 rpm, but since the aircraft had a constant-speed propeller, the tach should have read about 2,700 rpm. Manifold pressure, however, would have been significantly lower than sea-level numbers due to the high-density altitude.

To see how your favorite aircraft will perform in thin air, try a takeoff (on a long runway) using only 2,200 rpm on a fixed-pitch prop or 20–22 inches of manifold pressure (MP). The amount of runway required and the lackluster climb performance will be eye-opening. Want even more excitement? Try it at close to gross weight.

A mountain flying course somewhere along the Front Range is an excellent investment before attempting a solo flight in that region.

Exploring the flight envelope beyond the allowable center of gravity (CG) is an extremely bad idea. The manufacturer has already tested those limits and determined that there be dragons that exist beyond them. It’s a safe bet that the aircraft would be uncontrollable under such wind conditions. It might also be uncontrollable in far more benign conditions. Stalls would be ugly.

High winds in the mountains require a different perspective from pilots accustomed to flat terrain. Many may not fully appreciate the power of updrafts, downdrafts, wave action, shear, and rotors. The winds at Angel Fire were well beyond anything this low-time pilot had ever experienced, and they quickly overpowered the Mooney.

Twenty-five knots in the mountains is far more treacherous than the same wind speed in the midlands or coastal plains. Flying early or late in the day is often a much better strategy. Looking at historical METARs for KAXX on that March day, a 7 a.m. departure recorded winds from 120 degrees at 8 knots. By 6 p.m., winds were 200 degrees at 8 knots with a lower temperature, lower density altitude, and a far safer scenario.

Weather warnings had been posted, and the airport manager clearly communicated that it was a bad day to fly. The crosswind was nearly double what an experienced test pilot would tackle. At 500 hours of total flight time, a pilot has only begun to encounter the challenges aviation can present. Sadly, some wings get broken in the seasoning process.

----------BREAK ----------

Chapter 4 - Weather (and *still* nobody does anything about it)

Sample

“When all is said and done, the weather and love are the two elements about which one can never be sure.”

Alice Hoffman, author, Here on Earth

Once the basics of handling the aircraft are mastered, weather becomes the biggest variable. It is ultimately one of the most interesting challenges of aviation. There’s plenty to discuss. It’s divided into sections except for turbulence, which is addressed below. Light aircraft are vulnerable to weather and while we like to say they are “go-anywhere, go-anytime” machines, most are not. Even the airlines regularly stand down or delay. Ever been stuck in Atlanta, Dallas, New York, or Chicago on the airlines because of weather? Depending on the pilot, the geography, the aircraft, and the season, schedule reliability will range from about 98 percent to perhaps 30 percent.

Referring to these crashes as “weather accidents” is incorrect. They are pilot judgment tragedies - examples of trying to get somewhere on a schedule where the aircraft and/or the pilot just doesn’t have the juice to do it under the existing atmospheric conditions. After the crash it’s usually obvious what went wrong. The “why” is more elusive. The hard truth that safety advocates don’t like to admit is that many of us get away with some egregiously bad weather judgment regularly. The last link in the accident chain just didn't snap into place. If you want to complete more trips and make better informed choices, understanding weather is essential. *It’s also about being flexible in your plans.*

Mom was right!

Remember mom’s hot stove warning as a child? We got smart quickly because the result was immediate and certain. That certainty is missing from VFR-into-IMC, flying near thunderstorms, or where icing is predicted. Often, the weather is not as bad as the dire predictions, but sometimes it’s much worse. Smart pilots take the “almost” lessons to heart.

Risk is usually analog, not digital. It’s seldom “either/or.” If every time an IMC warning, thunder, or ice was in the forecast and the bad stuff really was there, pilots would stop messing with it. On the other hand, if we canceled every time there was some possibility of meteorological nastiness, a lot of trips would not be taken that could have been completed safely.

Learning weather - The weather is often better than forecast. The government has been on the losing end of too many “failure-to-warn” lawsuits so, rather than truth-in-forecasting, sometimes there is defensive forecasting. You can’t blame them. The science is getting much better, but a lot of art remains. Many commercial operators use risk analysis matrices that guide the dispatchers and pilots to a go- or no-go decision. The pros are methodical about it and generally have highly experienced pilots and much

more capable equipment. For light aircraft, it's tougher. We must identify, eat, and digest the whole weather enchilada ourselves.

In Alaska, much of NTSB's work centers on weather-related crashes. Low visibility, heavy icing, lots of vertical terrain, and the ever-present economic incentive create one of the most challenging flight environments on the planet. A second opinion can help tremendously and that's the role of dispatchers. For Part 135 operations, NTSB has recommended qualified dispatchers, so it splits the responsibility of deciding to launch between two people. Either pilot or dispatcher can turn down a flight. It doesn't work all the time, but the odds shift to there being at least one adult in the room.

Weather takes time to learn. One of the best books, *Weather Flying*, was written by Captain Bob Buck and revised by his son, Captain Rob Buck. Captain Buck wrote an article in the April 1972 issue of *Air Facts* magazine that laments that many forecasts are designed for meteorologists, not pilots. My take on that:

"Rather than get pilots to think like meteorologists, have meteorologists think like pilots."
Author

Flight Service is not how most pilots get weather briefings today. Now, it's mostly a do-it-yourself proposition for light GA without a dispatcher. 800-WX-BRIEF should have been 800-CAN-I-GET-THERE? Back in the heyday of flight service stations, briefings were a mixed bag – sometimes the crystal ball was clear when it should have been cloudy and in other cases the pessimist on duty would warn of destruction when the nearest convection was 100 miles away. …..

----------BREAK ----------

We safety types know how to rig the scales because only crashes are counted, and those statistics tell only one side of the story. Nobody keeps score of the good, or lucky, decisions where trips are successfully completed, so the glass is always more than half empty.

"You've got to know when to hold 'em, know when to fold 'em, know when to walk away, know when to run…"
Kenny Rogers, singer/songwriter

Smart gamblers and pilots set their losing limits. The weather odds are far better than the famed one-armed bandits in Vegas. Although electronic slots lighten your wallet even faster than aviation, they only take your money, not your life. *Passengers need to know when a trip is first planned, not at the airport after they arrive, that light aircraft trips require flexibility.* Take the stress off yourself and always have a Plan B which may include canceling.

Alternate Planning – This isn't often discussed but can have a significant impact on diversion experiences. The alternate airport may have an adequate runway and fuel, but other aspects can make for "interesting" experiences. Diverting to North Nowhere may be the perfect exploration of Americana or it could be a "Deliverance-type" event.

Should have checked the attendance hours!

Look for facilities that include rental cars (crew car, if you're lucky), some nearby hotels/restaurants, the right kind of fuel, and is it attended (or access is provided) so you can arrive or depart when desired (Gotten the T-shirt on this one.) It's irritating to have to wait until 0900 to gain access to the ramp and pay the bill…..

----------BREAK ----------

Calabasas - (Well-known basketball star is lost to IMC) Case study excerpt

Celebrity crashes always make news. Unfortunately, the cause of the crash is seldom new.

The NTSB does not refer to crashes by victim names but by location. While this doesn't help the public with immediate recognition, the objective is to provide a leveling effect that one person's life is just as valuable as another's. This incident, which included Kobe Bryant, retired LA basketball superstar, and his daughter who were enroute to play at a Saturday morning game along with seven other friends, heightened the media attention immeasurably.

Sikorski S-76B, Island Express, NTSB

Like Buddy Holly in the Day the Music Died, and the John Kennedy Jr. in Vineyard Spiral, it shows that pilot motivations remain ever the same of trying to get somewhere on a schedule when the weather just isn't cooperating. This detailed analysis touches on much of what this book is about – learning from the past and remembering it for the future. It showcases failures at multiple levels even when all the safety holes are supposedly plugged.

Helicopters routinely fly in much lower weather than fixed wing VFR operations because of slower speeds and the ability to land off-airport almost anywhere if the weather shuts down. That bailout option is not used nearly as much as it should be.

Pre-departure - On January 26, 2020, a Sikorsky S-76B helicopter, N72EX was chartered to fly retired basketball star Kobe Bryant, his daughter, and several friends from John Wayne Airport (SNA) Santa Ana, California, to Camarillo Airport (CMA) Camarillo, California.
According to NTSB, the charter was requested several weeks in advance. Departure time was planned for 9 a.m. A flight risk analysis form was completed by the pilot showing a cloud ceiling of less than 2,000 feet agl and with all factors considered, he coded it a low-risk flight. Before departure the charter broker and the pilot discussed a color-coded flight map. It depicted marginal VFR for Long Beach, Santa Monica, and Malibu pass. Instrument conditions were shown over downtown Los Angeles, Burbank (BUR), and Van Nuys. The pilot said he was going to go “up and around” and then “go east and north of the clouds.”

The Flight - Upon leaving SNA 9:07 a.m., the visibility was 4 miles in mist with a 1,000-foot overcast ceiling. Automatic dependent surveillance-broadcast (ADS-B) data showed that it flew northwest. At 9:20 am about 8.5 miles southeast of BUR, the pilot contacted the tower requesting special visual flight rules (SVFR) clearance through the Class C airspace to follow US Route 101 west through the BUR airspace toward CMA. The flight was told to hold outside of the BUR airspace because of traffic. The pilot requested cloud tops and was advised that they were reported at 2,400 ft msl. They were subsequently cleared for transition.

At 9:32 am the flight was cleared to follow I-5 northwest through the BUR airspace. The BUR weather showed calm wind, visibility of 2.5 miles, haze, and an overcast ceiling of 1,100 ft agl. Van Nuys (VNY) reported nearly identical conditions.

At 9:35 am, the pilot contacted the VNY tower for SVFR transition and reported his altitude as 1,400 ft msl. The helicopter was flying about 1,320 ft msl (520 ft agl). The controller cleared the flight through the VNY class D airspace at, or below, 2,500 ft msl along State Route 118, as the pilot had requested.

At 9:40 am, the pilot contacted SoCal Approach and noted that they were transitioning in “VFR conditions” at 1,500 ft msl to CMA. *At that time, they were just 570 feet above the ground.* The SoCal controller asked if they planned to “stay down low...all the way to [CMA],” and the pilot replied, “Yes sir, low altitude.” The controller advised that radar and radio contact would likely be lost and instructed the pilot to “Squawk VFR” and contact the CMA tower once closer to the airport, which the pilot acknowledged. At this point the helicopter was flying between 400 to 600 ft agl while remaining below 1,700 ft msl. NTSB: “At 0942:45, the helicopter reached US 101 and began to follow it west toward CMA while flying about 1,420 ft msl (550 ft agl). Groundspeed was about 140 kts. A witness who saw the helicopter flying over US 101 reported fog and overcast cloud conditions that varied with “heavy low clouds” in some places and areas where the clouds were “quite high.” She saw the helicopter flying “below or at the cloud line” before it “disappeared into heavy clouds” that she described as a “thick wall.” Based on ADS-B data, the helicopter was at the location the witness described about 0944:32 and was at an altitude of about 1,370 ft msl (450 ft agl.)”

At 0944:34, the pilot advised SoCal that the flight was “Gonna go ahead and start our climb to go above the, uh, layers, and, uh, we can stay with you here.” The helicopter immediately began climbing at about 1,500 ft per minute (fpm) and began a gradual left turn while remaining generally over US 101.

About 0945:10 it started a left turn away from US 101 reaching a maximum altitude of about 2,370 ft msl (about 1,600 ft agl). It then descended rapidly while remaining in the left turn. At 0945:17 (while the helicopter was descending), the SoCal controller asked the pilot’s intentions and the pilot replied that the flight was climbing to 4,000 ft msl. The controller asked his intentions after that but received no response. The last ADS-B data point for the flight was recorded at 0945:36, and the accident site was about 500 ft east of this point at an elevation of about 1,100 ft msl in hilly terrain.

Flight path up to 0944:32 and location of ground

According to a ground witness near the accident site, the area was surrounded by mist. He described the “normal sound of a helicopter flying for about 20 seconds.” He then saw the helicopter emerge from the clouds and roll left. He said the helicopter was visible for 1 to 2 seconds before it struck the ground and erupted into flames…..

----------BREAK ----------

There is a lot more weather discussion on crashes and <u>how to fly weather</u> – IFR into IMC, Convective and Icing …..

We then get into Automation (can’t live with it – can’t live without it) , Emergencies and finally conclude.

The goal is to acquaint pilots, your students (if you’re a CFI or Flight School/ University), or your organization with crashes that keep happening. This despite everyone “knowing” the that wax that holds the wings together will melt in close proximity to the sun – Alas Icarus!